43. (Amended) A composition comprising a carrier and a [the] polypeptide molecule [of claim 20] comprising a nucleic acid sequence encoding a heterologous protein in frame with the polypeptide molecule of SEQ ID NO: 2 [and a carrier].

63. (Amended) A method for reducing hemicellulose in a starting material, the method comprising:

administering to the starting material an effective amount of a polypeptide molecule of claim [20 or] 26 or an isolated polynucleotide molecule comprising a nucleic acid sequence encoding a heterologous protein in frame with the polypeptide molecule of SEQ ID NO: 2.

REMARKS

I. Status of the Claims/Amendments/Attachments

Claims 14-25, 35-42, 45-62 and 64-67 have been cancelled without prejudice and in response to the Restriction Requirement issued by the United States Patent Office.

Claims 34, 43, and 63 have been amended.

Claims 1-13, 26-33, 34, 43-44 and 63 are pending.

The claims as amended do not contain new matter. Various claims have been amended to recite the language of the claims to which they were previously dependent upon. The amended claim language is supported in originally filed claim 20.

II. Restriction Requirement

The Examiner has characterized the set of claims originally filed in the present application as including six (6) different inventions. These were characterized in the following six (6) sets of claims:

I. Claims 1-13, 26-33, 34, 43-44 and 63 - Composition comprising purified mannanase A and a method of use of the polypeptide in reducing the hemicellulose (class 435, subclass 200);

II. Claims 14-25, 35-42, 48-56 - DNA encoding the mannanase, vectors, host cell (class 435, subclass 252.3);

III. Claims 45-47 - Antibody (class 530, subclass 387.1);

IV. Claim 57 - Method of detecting DNA (class 435, subclass 6);

V. Claims 58, 61-62, 64-66 - Method of assessing carbohydrate degradation activity (class 435, subclass 18);

VI. Claims 39-60, 67 - Method of modulating the activity of mannanase (class 435, subclass 4).

In response to this Restriction Requirement, Applicant submits the present paper electing the invention of Group I, claims 1-13, 26-33, 34, 43-44 and 63, with traverse.

Applicant has cancelled claims 14-25, 35-42, 45-62 and 64-67, without prejudice. Applicant preserves all rights to pursue subject matter of the claims cancelled with full priority of the presently elected claims.

Applicant includes herewith a set of the claims as elected and amended (Attachment 1), as well as a clean copy of the clams (Attachment 2).

III. Conclusion

Applicant submits that the present paper is a complete response to the Office Action mailed August 27, 2002. Should the Examiner have any questions, comments or suggestions that would expedite the prosecution of this case to allowance, Applicant earnestly requests a telephone conference.

Respectfully submitted,

Dated: October 17, 2002.

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Marked - Up Set of Claims for U.S. Application Serial No. 09/917,378

What is claimed is:

1. A composition comprising a substantially purified mannanase A peptide, the mannanase A peptide comprising a catalytic domain GH5, a carbohydrate binding domain III, and a carbohydrate binding domain II.

2. The composition of claim 1 wherein the mannanase A peptide is further defined as comprising a linker and a signal peptide.

3. The composition of claim 1 or 2 wherein the first catalytic domain GH5 of the mannanase A peptide is further defined as having a length of about 370 to about 380 amino acids.

4. The composition of claim 1, 2, or 3 wherein the carbohydrate binding domain III of the mannanase A peptide is further defined as having a length of about 140 to about 160 amino acids.

5. The composition of claim 1, 2, 3, or 4 wherein the carbohydrate binding domain II of the mannanase A peptide is further defined as having a length of about 90 amino acids to about 110 amino acids in length.

6. The composition of claim 3 wherein the GH5 catalytic domain is further defined as the sequence of SEQ ID NO: 3.

7. The composition of claim 4 wherein the carbohydrate binding domain III is further defined as the sequence of SEQ ID NO: 4.

8. The composition of claim 5 wherein the carbohydrate binding domain II is further defined as the sequence of SEQ ID NO: 5.

9. The composition of claim 1 further defined as comprising a sequence of SEQ ID NO: 3, SEQ ID NO: 4, and SEQ ID NO: 5.

10. A mannanase A peptide having a sequence of SEQ ID NO: 1.

11. The mannanase A peptide of claim 10 further defined as having a sequence of SEQ ID NO: 2.

12. An industrial mixture suitable for degrading hemicellulose, such mixture comprising the mannanase A of claim 1.

13. The industrial mixture of claim 12 further defined as comprising a detergent.

14. (Cancelled) An isolated polynucleotide molecule comprising a nucleic acid sequence having an about 90% sequence identity to the nucleic acid sequence encoding the amino acid sequence SEQ ID NO:2.

15. (Cancelled) The isolated polynucleotide molecule of claim 14, comprising a nucleic acid sequence having at least 90% sequence identity to the nucleic acid sequence encoding the amino acid sequence of SEQ ID NO:2.

16. (Cancelled) The isolate polynucleotide molecule of claim 14, comprising a nucleic acid sequence having at least 90% sequence identity to the nucleic acid sequence encoding the amino acid sequence of SEQ ID NO: 3.

17. (Cancelled) The isolated polynucleotide molecule of claim 14, comprising a nucleic acid sequence having at least 90% sequence identity to the nucleic acid sequence encoding the amino acid sequence of SEQ ID NO: 4.

18. (Cancelled) The isolated polynucleotide molecule of claim 14, comprising a nucleic acid sequence having at least 90% sequence identity to the nucleic acid sequence encoding the amino acid sequence of SEQ ID NO: 5.

19. (Cancelled) The isolated polynucleotide molecule of claim 14, comprising a nucleic acid sequence having at least 90% identity to the nucleic acid sequence of SEQ ID NO:1.

20. (Cancelled) An isolated polynucleotide molecule comprising a nucleic acid sequence encoding a heterologous protein in frame with the polypeptide molecule of SEQ ID NO:2.

21. (Cancelled) The isolated polynucleotide molecule of claim 20, wherein the heterologous protein is a peptide tag.

22. (Cancelled) The isolated polynucleotide molecule of claim 21, wherein the peptide tag is 6-His, thioredoxin, hemaglutinin, GST, or OmpA signal sequence tag.

23. (Cancelled) The isolated polynucleotide molecule of claim 20, wherein the heterologous protein is a substrate targeting moiety.

24. (Cancelled) The isolated polynucleotide molecule of claim 20, operably linked to a transcriptional or translational regulatory sequence.

25. (Cancelled) The isolated polynucleotide molecule of claim 24, wherein the transcriptional or translational regulatory sequence comprises a transcriptional promoter or enhancer.

26. An isolated polypeptide molecule comprising:

a) a sequence of SEQ ID NO: 3;

b) a sequence of SEQ ID NO: 4;

c) a sequence of SEQ ID NO: 5;

d) a sequence of SEQ ID NO: 1;

e) a sequence of SEQ ID NO: 2; or

f) an amino acid sequence having at least 70% sequence identity with the amino acid sequence of a), b), c), or d).

27. The polypeptide molecule of claim 26, having at least 90% sequence identity with the amino acid sequence of a), b), c), or d).

28. A fusion protein comprising the polypeptide of claim 26 and a heterologous peptide.

29. The fusion protein of claim 28, wherein the heterologous peptide is a substrate targeting moiety.

30. The fusion protein of claim 29, wherein the heterologous peptide is a peptide tag.

31. The fusion protein of claim 29, wherein the peptide tag is 6-His, thioredoxin, hemaglutinin, GST, or OmpA signal sequence tag.

32. The fusion protein of claim 29, wherein the heterologous peptide is an agent that promotes polypeptide oligomerization.

33. The fusion protein of claim 32, wherein the agent is a leucine zipper.

34. (Amended) A mannanase-substrate complex comprising an [the] isolated polypeptide molecule comprising a nucleic acid sequence encoding a heterologous protein in frame with the polypeptide molecule of SEQ ID NO: 2 [of claim 20] bound to hemicellulose.

35. (Cancelled) A vector comprising the polynucleotide molecule of claim 20.

36. (Cancelled) A vector comprising the polynucleotide molecule that encodes the polypeptide of claim 26.

37. (Cancelled) A host cell genetically engineered to express the polynucleotide molecule of claim 20.

38. (Cancelled) A host cell genetically engineered to express the polynucleotide molecule of claim 26.

39. (Cancelled) The host cell of claim 37, wherein the host cell is a plant cell.

40. (Cancelled) The host cell of claim 38 wherein the host cell is a plant cell.

41. (Cancelled) The host cell of claim 37, wherein the host cell is a bacterial cell.

42. (Cancelled) The host cell of claim 38, wherein the host cell is a bacterial cell.

43. (Amended) A composition comprising a carrier and a[the] polypeptide molecule [of claim 20] comprising a nucleic acid sequence encoding a heterologous protein in frame with the polypeptide molecule of SEQ ID NO: 2 [and a carrier].

44. A composition comprising the polypeptide molecule of claim 26 and a carrier.

45. (Cancelled) An isolated antibody that specifically binds to the polypeptide molecule of claim 20 or 26.

46. (Cancelled) The antibody of claim 45, wherein the antibody is a polyclonal antibody.

47. (Cancelled) The antibody of claim 45, wherein the antibody is a monoclonal antibody.

48. (Cancelled) A method for producing mannanase A polypeptide, the method comprising:

incubating a host cell genetically engineered to express the polynucleotide molecule of claim 20 or 26.

49. (Cancelled) The method of claim 48, further comprising the step of:

isolating the mannanase A polypeptide from the incubated host cells.

50. (Cancelled) The method of claim 48, wherein the host cell is a plant cell.

51. (Cancelled) The method of claim 48, wherein the host cell is a bacterial cell.

52. (Cancelled) The method of claim 48, wherein the host cell is genetically engineered to express a selectable marker.

53. (Cancelled) The method of claim 48, wherein the host cell further comprises a polynucleotide molecule encoding one or more polypeptide molecules selected from the glycoside hydrolase family of proteins.

54. (Cancelled) The method of claim 53, wherein the glycoside hydrolase is a thermostable glycoside hydrolase.

55. (Cancelled) A set of amplification primers for amplification of a polynucleotide molecule encoding mannanase A, comprising:

two or more sequences comprising 9 or more contiguous nucleic acids derived from the polynucleotide molecule of claim 20.

56. (Cancelled) A probe for hybridizing to a polynucleotide encoding mannanase A, comprising:

a sequence of 9 or more contiguous nucleic acids derived from the polynucleotide molecule of claim 20.

57. (Cancelled) An assay method for the detection of a polynucleotide encoding mannanase A, comprising:

amplifying a nucleic acid sequence with a set of amplification primers comprising two or more sequences of 9 or more contiguous nucleic acids derived from the polynucleotide molecule of claim 20; and

correlating the amplified nucleic acid sequence with detected polynucleotide encoding mannanase A.

58. (Cancelled) A method for assessing the carbohydrate degradation activity of mannanase A comprising:

analyzing a carbohydrate degradation in the presence of mannanase A and a carbohydrate degradation in the absence of mannanase A on a substrate; and

comparing the carbohydrate degradation in the presence of mannanase A with the carbohydrate degradation in the absence of mannanase A.

59. (Cancelled) A method for assessing the carbohydrate degradation activity of mannanase A in the presence of an agent of interest comprising:

analyzing a carbohydrate degradation in the presence of mannanase A and a carbohydrate degradation in the presence of mannanase A and the agent of interest on a substrate exposed; and

comparing the carbohydrate degradation in the mannanase A treated substrate with the carbohydrate degradation in the mannanase A treated substrate in the presence of the agent of interest.

60. (Cancelled) The method of claim 59, wherein an increase in carbohydrate degradation activity in the presence of the agent of interest demonstrates stimulation of mannanase A activity and wherein a decrease in carbohydrate degradation activity demonstrates inhibition of mannanase A activity.

61. (Cancelled) The method of claim 58, wherein the carbohydrate is hemicellulose.

62. (Cancelled) The method of claim 58 wherein the agent of interest is an antibody.

63. (Amended) A method for reducing hemicellulose in a starting material, the method comprising:

administering to the starting material an effective amount of a polypeptide molecule of claim [20 or] 26 or an isolated polynucleotide molecule comprising a nucleic acid sequence encoding a heterologous protein in frame with the polypeptide molecule of SEQ ID NO: 2.

64. (Cancelled) The method of claim 61, further comprising administering a second polypeptide molecule selected from the glycoside hydrolase family of proteins.

65. (Cancelled) The method of claim 61, wherein the polypeptide molecule of claim 20 is thermostable.

66. (Cancelled) The method of claim 61, wherein the starting material is agricultural biomass.

67. (Cancelled) The method of claim 60, wherein the starting material is paper pulp.